

3-4 Bronchospasm v.2

Signs and symptoms include: expiratory wheeze, prolonged expiration, increased inflation pressures, desaturation, hypercapnia, upsloping capnograph trace, silent chest.
Can occur alone or as part of another problem.

START

- 1 Call for help and inform theatre team of problem.
- 2 Give 100% oxygen.
- 3 Stop surgery / other stimulation.
- 4 Fully expose the chest and perform a rapid systematic examination:
 - Inspect, percuss, palpate, auscultate.
 - Absence of wheeze may indicate severe bronchospasm with no air movement.
- 5 Deepen anaesthesia:
 - Bronchospasm may be a consequence of light anaesthesia.
 - Inhalational anaesthetic agents are bronchodilators.
 - Avoid isoflurane or desflurane if possible – airway irritant if increased rapidly.
- 6 Exclude malpositioned or obstructed tracheal tube or supraglottic airway
 - Consider whether there could be endobronchial or oesophageal intubation.
- 7 If anaphylaxis suspected → 3-1
- 8 If airway soiling/aspiration suspected airway see Box A.
- 9 Treat bronchospasm (Box B). First line is salbutamol by metered dose inhaler or by nebuliser; i.v. route is second line. Other drugs at clinician discretion.
- 10 Consider alternate diagnoses causing or mimicking bronchospasm (Box C).
- 11 Use appropriate ventilation strategy (Box D).
- 12 If raised airway pressure and/or desaturation persists, consider → 2-2 Hypoxia/ desaturation/cyanosis.
- 13 Obtain a chest X-ray as soon as clinically safe to do so.
- 14 Plan appropriate placement for post-procedure care.

Box A: ACTIONS IF AIRWAY SOILING/ASPIRATION

Consider tracheal intubation and tracheal toilet
Use nasogastric tube to aspirate gastric contents
Chest X-ray
Consider post op level of care and follow-up

Box B: DRUG DOSES

Salbutamol	Nebuliser: Child <5 yr, 2.5 mg; Adult and >5 yr 5 mg i.v. bolus: Adult 250 µg diluted, slowly; Child 1-23 months 5 µg.kg ⁻¹ once over 5 mins; Child 2-17 years 15 µg.kg ⁻¹ once over 5 mins (max. 250 µg) Adult i.v. infusion: 5-20 µg.min ⁻¹ Child i.v. infusion: 0.5-1 µg.kg ⁻¹ .min ⁻¹ (max. 20 µg.min ⁻¹)
Ipratropium	Neb: 2-12 yr 0.25 mg; Adult 0.5 mg
Adrenaline	Neb: Child 0.5 ml of 1:1000 Neb: Adult 5 ml of 1:1000 i.m.: <6 mo 50 µg; <6 yr 120 µg; <12 yr 250 µg; Adult 500 µg Slow i.v. bolus: 0.1 - 1 µg.kg ⁻¹ (Adult 10-100 µg)
Magnesium	i.v. over 20 min: 50 mg.kg ⁻¹ (Adult 2 g)
Ketamine	Bolus: Adult 20 mg i.v. Infusion: 1-3 mg.kg ⁻¹ .hr ⁻¹
Aminophylline	i.v. over 20 min: 5 mg.kg ⁻¹ (omit if already on theophylline) i.v. infusion: <9 yr 1 mg.kg ⁻¹ .hr ⁻¹ ; <16 yr 0.8 mg.kg ⁻¹ .h ⁻¹ ; Adult 0.5 mg.kg ⁻¹ .h ⁻¹
Hydrocortisone	4 mg.kg ⁻¹ (Adult 200 mg)

Box C: ALTERNATES and MIMICS

Wheeze: pulmonary oedema; misplaced airway device; ARDS; laryngospasm
Raised airway pressure: obstruction of larynx, trachea or bronchi; obstruction of breathing system (any part); decreased lung compliance; pneumothorax

Box D: VENTILATION STRATEGIES

Increase expiratory time to allow complete expiration
Pressure control ventilation may be better
Be alert to 'breath stacking'
Permissive hypercapnia may be appropriate